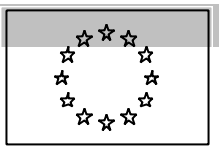
European Commission

Community Research



SP1 – Priority 6-1

6.1 Sustainable energy systems

Work Programme

6.1 Sustainable Energy Systems

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6.1.1.Introduction

Europe's energy system demonstrates unsustainable patterns of development characterised by growing dependence on imported fossil fuels, rising energy demand and growing CO_2 emissions. These unsustainable patterns are exacerbated in key sectors like buildings and transport that are intimately linked with the quality of life of European citizens. The challenge is to alleviate and reverse these adverse trends to achieve a truly sustainable energy system, while preserving the equilibrium of ecosystems and encouraging economic development.

The strategic and policy objectives of this programme of research[1] into sustainable energy systems include reducing greenhouse gases and pollutant emissions (Kyoto), increasing the security of energy supplies, improving energy efficiency and increasing the use of renewable energy, as well as enhancing the competitiveness of European industry and improving quality of life both within the EU and globally (Johannesburg follow-up).

In addressing these objectives through this Work Programme, a clear differentiation is made between research activities having the potential for exploitation in the short to medium term and those which are expected to have an impact in the medium to longer term. This distinction between the short-to-medium and medium-to-long term time frames is applicable to all indirect research actions in the sustainable energy sector and it is intended that the budgetary appropriations be split equally between the two time frames.

Research activities having an impact in the short to medium term

Community research is one of the main instruments which serve to support the development and implementation of new legislative instruments and other policy measures in the field of energy and to change significantly current unsustainable patterns of development. In the short to medium term, the goal is to pave the way for the introduction of innovative and cost competitive renewable and energy efficiency technologies into the market as quickly as possible through demonstration and other research actions aiming at the market, thus supporting the future development and implementation of the EU Directives on electricity from renewable energy sources and on the energy performance of buildings, as well as the proposed Directives on cogeneration (CHP) and the establishment of regulatory and fiscal measures for the promotion of liquid biofuels.

From a programme implementation perspective the objective is to bring forward and demonstrate the next generation of cost-effective technologies at full scale. The scale of demonstration projects should allow a comprehensive life-cycle assessment under real life conditions. New integrated projects will mobilise the necessary actors and resources to create real life laboratories to investigate the optimal market penetration paths and the most sustainable alternatives. Projects will include socio-economic research into the interfaces between the new energy technologies and their markets, for example innovative policy packages, financing mechanisms and user/consumer acceptance.

Proposals addressing short-to-medium term research should comply with one or more of the following guidelines:

- Deliver results, which will accelerate the market penetration of innovative energy technologies with a particular emphasis on 2010 energy policy objectives.
- Consist mainly of integrated demonstration actions with a typical research component of up to about 20% and including, where appropriate, pre-normative research, energy

[1] The word "research" used in the general sense refers to research, technological development and demonstration activities.

technology integration, dissemination and technology transfer activities. The risks to be addressed are mainly technological and might include market related and financial issues.

- Demonstrate reductions in the costs associated with implementation of new technologies and/or demonstrate how innovative technological solutions can be integrated under full-scale operating conditions.
- Provide inputs for the future development of energy policy and legislation, including the improvement of existing regulatory measures, whilst serving EU research and related policies.

The research components of short to medium term projects should adopt a multidisciplinary approach, including, where appropriate, socio-economic research on the future policy, market and end user impacts of the innovative energy technologies involved, in addition to technology focused research.

Research activities having an impact in the medium to long term

The medium to long term research objective is to develop new and renewable energy sources, and new carriers such as hydrogen which are both affordable and clean and which can be well integrated into a future sustainable energy supply both for stationary and transport applications.

The future large-scale development of these technologies will depend on significant improvements in their cost and other aspects of competitiveness against conventional energy sources. The overall socio-economic and institutional context in which they are deployed will be covered in a synergetic approach, which takes account of energy and other related policies.

Proposals addressing medium-to-long term research should:

- Deliver results which could be widely exploited commercially or otherwise, with a time horizon generally beyond 2010; further development and particularly demonstration type actions may be necessary before technologies are ready for full-scale commercial use.
- Consist mainly of research and development activities (including pre-normative and socio-economic research and the validation of technical and economic feasibility in pilot plants and prototypes), research-related networking activities, training and dissemination activities. The main risks to be addressed are scientific and technological rather than market and financial.
- Lead to the generation, exploitation and dissemination of new knowledge and contribute to the implementation of EU research policy, whilst also contributing to the development of energy and associated policies.

The research activities to be funded in the medium-to-long term should address not only the technological aspects, but also incorporate in a multidisciplinary approach the socio-economic research necessary to overcome the non-technical obstacles for the penetration into markets of the technologies concerned.

6.1.2.Objectives, Structure and Overall Approach

6.1.2.1. Implementation Principles

The Sixth Framework Programme (FP6) differs significantly from previous ones. A key difference is its role in contributing to the creation of the European Research Area (ERA) in sustainable energy systems. This means that the aim is to assemble a *critical mass of*

resources, to *integrate* research efforts by pulling them together and to make this research more *coherent* on the European scale.

Focus on priorities – to ensure concentration of effort and maximise the impact of the Programme, it is intended to focus research on a limited number of priority topics. The response to the 2002 invitation to submit Expressions of Interest, together with other inputs on the strategic importance of research in certain key fields, has been used to define the content of the Work Programme and, particularly, to focus the first Calls for Proposals. However, it is strongly emphasised that the previous submission of an EoI will have no bearing on the evaluation of any proposal in subsequent calls for proposals.

Priority use of the new instruments – the Commission intends to use the new instruments (Integrated Projects and Networks of Excellence) as a priority from the start of FP6, depending upon the quality of proposals received and their relevance to the objectives of the Programme, whilst maintaining the use of the other types of instrument – Specific Targeted Research Projects, Co-ordination Actions and Specific Support Actions.

Selection of topics – approximately 810 Meuro is available for RTD on sustainable energy systems, spread over the four years of the Programme (2003-2006). Calls for Proposals will thus need to be selective as it will not be possible to fund all potential topics of interest within the priority areas identified in the Specific Programme. Furthermore, there may be competition between proposals both across and within research topic areas in each call, which may result in some topics not being supported.

6.1.2.2. Horizontal aspects to be taken into consideration by proposers

Proposals should follow the general guidelines for submission (see FP6 InfoPack). Important general information on cross-cutting issues is mentioned in the General Introduction to the overall Work Programme, complemented by the specific aspects related to energy below :

International scientific co-operation: Global international co-operation will be encouraged for research activities addressing the environmental consequences of energy policies, energy supply inter-dependency, and cross border energy and environmental issues. The focus will be on activities of mutual concern and synergy with other international programmes and initiatives such as those of the International Energy Agency. Activities will therefore be encouraged in the form of:

- initiatives aimed at securing a leading role for Europe in international research efforts on global sustainable energy issues;
- integrated bilateral co-operation activities in sustainable energy research with third countries or groups of third countries;
- participation of third country researchers and organisations in sustainable energy research projects and networks in areas of common interest.

Cross-cutting dimension in energy research: The technologies covered by this work programme are often integrated into systems combining several of them for different applications e.g. fuel cells and hydrogen, renewable energy sources in combination with reversible fuel cells and hydrogen, hydrogen production and CO_2 sequestration, advanced hybrid systems integrating fuel cells with conventional technologies etc. Such combinations can lead to important synergies and proposals developing such approaches can be envisaged. The integration of different renewable energy technologies into supply and distribution networks, together with energy demand management, is of particular interest (see section 6.1.3.1.1.2).

6.1.2.3. Modalities for implementation

This part of the work programme will be implemented using Integrated Projects (IP), Networks of Excellence (NoE), Specific Targeted Research Projects (STRP), Co-ordination Actions (CA) and Specific Support Actions (SSA), as indicated in the Roadmap (Table 1).

Proposals for Integrated Projects and Specific Targeted Research Projects can be for research and technological development projects, demonstration projects or a combination of the two. For research and technological development activities, STRPs should be focused on specific topics of an exploratory and/ or high-risk innovative nature.

Proposals for Co-ordination Actions should preferably be new initiatives for the networking and co-ordination of research and innovation activities in areas of interest for the programme. If successful, the outcome of such actions could, in due course, form a basis for future IPs or NoEs.

The purpose and nature of Specific Support Actions is described in the General Introduction to the overall Work Programme. They will include actions to stimulate, encourage and facilitate the participation of organisations from the candidate countries in the activities of the priority thematic areas, in particular via the Networks of Excellence and Integrated Projects.

Further information on all of the above instruments, including levels of funding, and the issues expected to be addressed in proposals are contained in the FP6 InfoPack.

6.1.3.Technical Content

The sustainable energy systems work programme will be implemented in two complementary parts – RTD activities having the potential for exploitation in the short to medium term and those which are expected to have an impact in the medium to longer term. The differing characteristic profiles of the activities expected to be supported in each part of the programme are explained in Chapter 6.1.1. Co-ordination between the two parts will be ensured.

6.1.3.1. Research activities having an impact in the short and medium term

In accordance with the principle of focussing research effort, the following sections 6.1.3.1.1 to 6.1.3.1.3 first describe the main objectives to be achieved and the strategically important areas in which research should be concentrated. They then go on to provide details of the technical content of the first call (Call 2003.SM) and an indicative content for the second call (Call 2004.SM). *Research areas described below but not included in the first and second calls for proposals may be included in subsequent calls.*

6.1.3.1.1. Clean energy, in particular renewable energy sources and their integration in the energy system, including storage, distribution and use

6.1.3.1.1.1. Cost-effective supply of renewable energies

Actions should be aimed at bringing the next generation of more cost-effective renewable energy technologies to the market, with particular emphasis on markets in Europe. The results should enable these technologies to compete in the liberalised energy markets of the future with substantially reduced levels of subsidy, and also help to bring them within reach of developing countries. The main tasks to be carried out will explore ways to reduce the costs of the energy delivered by specific renewable energy technologies, in the form of *green electricity, heat/cooling, and liquid/gaseous biofuels*.

Electricity from biomass and/or waste derived fuels (including solid as well as liquid resources e.g. black liquor, and waste recovered fuels or effluents e.g. sludge) - projects should focus on one or more of the following: o*ptimisation of the fuel supply chain* taking into consideration all aspects of fuel production (in case of dedicated energy crops and short rotation forestry) and preparation of the fuel to high standards and specifications; c*ombinations with fossil fuels* designed to guarantee the continuous supply of electricity to final users, such as advanced co-firing and co-combustion; *innovative technologies for large scale electricity generation,* such as integrated gasification combined cycle plants, dedicated gasification to power plants, biomass boilers, flash pyrolysis applications where the emphasis is placed on achieving high conversion efficiencies and high reliability of the technology.

Electricity from wind : projects should focus on one or more of the following: i*nnovative wind turbines, components and design tools* for reliable electricity generation at reduced costs using either onshore or offshore wind farms; including modelling of large multi-megawatt turbine structures and the corresponding site assessment, that facilitate a move towards design limits, new design principles and materials, including more realistic load assumptions for larger machines; *Reduction of development constraints* which hamper the large deployment of wind energy in unconventional sites (offshore, cold climates, complex terrain) by demonstrating technical control mechanisms to maintain the stability

of the grid (grid based control, turbine control and consumption control); together with short-term output forecasting.

Electricity from photovoltaics. Priorities to be addressed are: *Innovative production concepts* for high efficiency PV cells/modules to be integrated into larger scale (multi-MW) photovoltaic production facilities in order to lower the Wp cost; and including low cost integrated components or devices for grid connected or stand alone PV generators; Support actions aimed at *kick-starting Si-feedstock production by EU industries* to secure a reliable and affordable supply for fostering PV cell cost reductions; *Transfer to industrial scale* of a new generation of PV technologies / products to facilitate the integration of innovative solutions at lower costs; *Large area, low cost photovoltaic modules for building integrated PV (BIPV) and autonomous solar electricity generation systems* in industrialised and developing countries; *Integration of photovoltaic installations* in generation schemes to feed local distribution grids, closer to the point of use and development of new devices and systems to manage these installations.

Electricity from other renewable energy sources - projects should focus on one or more of the following: *Solar thermal power* for the large scale generation of electricity using power tower, trough or dish technologies, delivering reliable supplies of electricity to the grid at competitive prices; *Geothermal energy* for electricity generation and/or combined heat and power (CHP) generation employing innovative, environmentally sustainable and cost competitive technologies; *Small-scale hydro power plants,* for electricity generation with reduced costs, acceptable environmental impacts and competitive performance; *Ocean energy technologies,* including wave, ocean current and tidal technologies, which are ready for demonstration at full scale and for commercial exploitation with competitive performance and prices.

Heat/cooling from renewable energy sources: projects should focus on one or more of the following : *Heat from biofuels and/or waste derived fuels,* including applications in industry and in buildings, as well as CHP, either individually or with district heating. Preference will be given to novel systems that utilise liquid or gaseous biofuels; *Solar heating and cooling* based on a new generation of solar water heating, solar space heating and/or cooling systems, *or* "combi-systems", which are designed for large scale production with improved performance and reduced costs*; Solar industrial process heating or solar desalination systems* with improved performance at competitive costs; *Geothermal energy for heating and cooling* employing innovative environmentally sustainable and cost competitive technologies, including ground coupled heat pumps.

Production and processing of liquid and gaseous biofuels, including the production of alcohol, ether, bio-diesel, and biogas. For the next generation of liquid bio-fuel production plants, priority will be given to processing via the synthesis gas route or enzymatic and acid conversion of lignocellulose to ethanol while their overall energy balance and CO_2 reduction contribution should be very high. Production on a sustainable basis of bio-energy resources may include energy crops, short rotation coppice, waste recovered fuels etc, as well as the logistics of harvesting, drying, and feeding in the complete bio-fuel chain from planting to marketing of an energy product.

6.1.3.1.1.2. Large-scale integration of renewable energy sources into energy supplies

Short / medium term research on the large scale integration of renewable energy sources into energy supplies is needed in support of the EU's commitments to increase the percentage of renewable energy sources in its supply mix. At the same time, the EU is committed to major reductions in energy intensity and this will require substantial increases in the adoption of innovative technologies for the management of energy

demand. Research on the large scale integration of renewable energy sources into existing energy supplies and networks should therefore address the inevitable and dynamic interactions between centralised and decentralised energy supplies and demands at the systems level, which is typically more complex when advanced energy management systems are employed.

In this context, priority will be given to two types of action: **(i) Support actions** which contribute to a better understanding of the potential problems and solutions associated with enhanced distributed generation in existing grids, including hybrid systems and different levels of renewable energy integration, (including storage where applicable) into electricity and heat distribution grids, networks and related end-use applications; **(ii) Large scale integrated projects** in clearly defined geographical areas or zones, within which all of the relevant energy flows (supply and demand) can be identified, measured and assessed. Such projects are expected to involve communities together with local industries, agencies, and utilities in cities, towns and rural areas (including islands), which are committed to integrating renewable energy sources (RES) and efficient demand management technologies in a comprehensive and innovative way into their local energy economies.

Projects should address innovative technical approaches to the production, storage, integration and use of : ***RES electricity***, such as wind, biomass and wastes, solar PV, geothermal, and hydro , including where appropriate the integration of *distributed electricity generation* at different network voltage levels with demand side management programmes, local energy management techniques and the co-ordinated provision of sustainable energy services with a high degree of local autonomy and supply security; e*lectricity storage systems* including advanced batteries, hydrogen and other electricity storage devices either for supplying short-term peak demands or for balancing variations in renewable electricity supply, as well as innovative socio-economic approaches to integrated energy planning, leading to local policies, codes, and regulations; ***Medium and low temperature RES heating and cooling***, such as locally optimised schemes for providing heating and cooling from solar, geothermal and biomass sources in buildings and industry, and establishing advanced distribution systems (district heating and cooling networks) with integral storage systems as appropriate; ***Polygeneration***[2]; ***Liquid and gaseous biofuels*** and recovered fuel production and processing on a commercial basis and their use in buildings, industry and transport.

The research component of such projects may include the development and analysis of innovative technologies and innovative technology integration schemes, as well as socio-economic analysis and assessments of market impacts, planning, financing schemes, local co-operatives and end user issues.

Research areas and topics for 2003 (Call 2003.SM)

Cost-effective supply of renewable energies:

a) Proposals for Integrated Projects are invited for the following topics:

- **Large innovative wind turbines, components and design tools** for reliable electricity generation at reduced costs using either onshore or offshore wind farms, including collaboration with experienced actors to address issues of interfaces with electricity grids, modelling of the turbine structures, meteorology issues, and corresponding site assessments that facilitate a move towards design limits, new design

[2] Polygeneration encompasses the combined production of electricity, heat, cold and products (hydrogen or other fuels or chemicals), district heating or cooling systems or other advanced energy services.

principles and materials, including more realistic load assumptions for large machines. Priority will be given to demonstrations in areas with the potential for substantial future market growth.

- **Low cost photovoltaic modules with integrated dc/ac inverters that can feed power directly into the grid.** The concept should be applicable to modules from different suppliers. The innovation should meet utility requirements for integration with electricity grids at low voltage levels, and also meet the requirements for ease and reliability of building integration.

b) Proposals for Specific Targeted Research Projects are invited in the following areas:

- ***Innovative combinations of biomass and wastes with fossil fuels*** for large scale supply of renewable electricity to final users, such as advanced co-firing and co-combustion;
- ***Innovative wind turbines, components and design tools*** for reliable electricity generation at reduced costs using either onshore or offshore wind farms;
- Transfer to industrial scale of a ***new generation of PV technologies / products,*** including PV in buildings, which demonstrate innovative integrated solutions for supplying solar electricity at lower costs;
- ***Geothermal energy*** for electricity generation, combined heat and power (CHP), and/or for heating and cooling, using innovative, environmentally sustainable technologies.

c) Proposals for Co-ordination Actions and Specific Support Actions are invited in the areas described in Section 6.1.3.1.1.1.

Large-scale integration of renewable energy sources into energy supplies:

Proposals for Co-ordination Actions and Specific Support Actions are invited in the areas described in Section 6.1.3.1.1.2. above.

In particular, support is envisaged for actions that will complement the future Integrated Projects to be submitted under the CONCERTO initiative (see below), addressing the following topics:

- **RES-Electricity**, including the development of integrated energy services, leading to the implementation of local policies, codes, and regulations .
- **Distributed electricity generation** in existing grids at different network voltage levels, district heat grids, demand side management programmes, local energy management techniques and storage, and the co-ordinated provision of sustainable energy services with a high degree of local autonomy and supply security; including innovative solutions to grid issues addressing the intermittent character of RES.
- **Electricity storage systems** including combinations of renewable energy systems (e.g. windpark and hydropower storage system), advanced batteries, hydrogen and other electricity storage devices for balancing variations in renewable electricity supply.
- **Heating and cooling:** integrated heat planning; distribution grids, storage and management systems for RES-heating and cooling.

Research areas and topics for 2004 (Call 2004.SM)

Cost-effective supply of renewable energies:

The cost effective supply of renewable energies activity will not be open for proposals.

Large-scale integration of renewable energy sources into energy supplies:

Priority will be given to Integrated Projects as described below. However, proposals for Specific Targeted Research Projects, Co-ordination Actions and Specific Support Actions are also invited in the areas described in Section 6.1.3.1.1.2.

Managing energy demand and renewable energy supply in high performance communities

- Proposals for Integrated Projects, which address the *large scale integration of renewable energy sources into energy supplies* together with *eco-buildings* and *polygeneration* (see section 6.1.3.1.2) are invited for support under a co-ordinated initiative ***"CONCERTO".***

Proposals should focus on the demonstration of innovative technologies and innovative technology integration schemes, and should involve all of the relevant market actors, including community representatives, local industries, agencies, and utilities in cities, towns, rural areas or islands. The main aim should be to substantially improve the performance of energy systems for new and / or existing communities, aiming to improve the sustainability of their systems. In order to achieve this aim, projects should apply highly efficient energy saving measures, significantly increase the percentage of renewable energy supplies and integrate the self supply of renewables and polygeneration into eco-buildings.

Such communities should be in clearly defined geographical areas or zones, within which all of the dynamic interactions and relevant energy flows between centralised and decentralised energy supplies and demands can be identified for measurement and assessment purposes. Projects should also adopt, where appropriate, innovative approaches to polygeneration together with innovative energy management practices and advanced technologies in eco-buildings. Renewable energy source-based transport components may also be included.

Projects to be supported under this initiative must therefore meet the requirements of section 6.1.3.1.1.2 for *Large-scale integration of renewable energy sources into energy supplies),* and of Section 6.1.3.1.2.1. together with the details given in the first Call 2003.SM for *Eco-buildings.* Concerning *Polygeneration,* projects should meet the requirements of Section 6.1.3.1.2.2 with a focus on the optimisation of the whole self-supply-demand chain, and may address small, medium or large scale applications, for example a) residential for the individual requirements of residential houses, integrated into a larger network of the community; b) collective or tertiary with district heating/cooling applications; c) industrial scale for larger communities with a special emphasis on reducing the network costs and on overall system efficiency.

Proposers should ensure the commitment of local energy end users, and of the various stakeholders in the relevant energy supply chains as well as community decision makers and other local market actors. Project teams should include researchers with the expertise to address the measurement and analysis of energy flows, as well as socio-economic experience to address matters related to the the integration of the approach into local community development plans.

Projects should involve the full menu of energy research activities, typically including up to about 20% for research (development and analysis of innovative energy systems, technology and market/economic risk assessment, socio-economic analysis, performance

monitoring, and training), about 75-80% for demonstration (of the integration of RES and RUE technologies), and about 5% for the promotion and dissemination of project results.

Projects are expected to produce well monitored field experience of energy supply and demand patterns, in local energy economies having a high percentage of renewable energy supply, together with detailed information on the performance and reliability of the innovative energy supply and end use technologies involved. A socio-economic research component should analyse the local trends in energy costs, prices and savings, as well as the social impacts, quality and added values of the energy services provided. The projects are also expected to include analyses of technical and market risks, cost reduction potentials and future market potentials for the technologies and approaches adopted.

The results from such projects will demonstrate the high potential for energy savings which can be achieved by addressing energy supply and demand with a fully integrated approach in high performance communities. They should also result in new "good practices", which can be used in the future as examples to raise the confidence of potential decision-makers, investors and final users.

In addition, the technical and socio-economic analyses from such projects, which integrate technology, social and economic aspects, will support the future development and implementation of energy policy, by providing well documented field experience which can be used as a basis for developing new regulations (e.g. for distributed electricity generation), for improving the security of energy supplies in future energy markets, for the further development of support schemes for RES and RUE technologies (e.g. feed in laws, green certificate schemes, energy taxation), for planning guidance, and for energy cost and price reductions.

6.1.3.1.2. Energy savings and energy efficiency, including those to be achieved through the use of renewable raw materials

The overall objective is to substantially contribute directly or indirectly to the EU targets of (1) reducing energy intensity by 18% for the year 2010, (2) achieving a *global indicative community target of 18% of electricity consumption from co-generation by the year 2010*, (3) doubling the share of renewables from 6% to 12% for the year 2010 and (4) contributing to achieving the objectives of the internal market for energy, and (5) the policy of security of energy supply. Projects should also make a concrete input to the European Climate Change Programme.

The demand for cold (including air-conditioning, refrigeration, and freezing) has grown exponentially all over Europe in industry, residential and commercial buildings. This trend is expected to continue in the next years, and to penetrate also the market for private houses. Cooling and freezing are usually very energy intensive, and, if nothing is done, this predicted growth may annihilate all efforts of energy savings in buildings and industry, as targeted in the directive on the energy performance of buildings and in the green paper on security of energy supply. Today many new tertiary buildings are equipped with air conditioning, although appropriate eco-building design could have avoided the need to install air conditioning systems in the first place.

6.1.3.1.2.1. Eco-buildings

The building sector is at present responsible for more than 40% of EU energy consumption. There are technologies under development, which could substantially improve (up to 30%) the energy performance of buildings, reducing the conventional energy demand in new and existing buildings and substantially contributing to reduce

energy intensity, through combined measures of rational use of energy and integration of renewable energy technologies.

The Eco-buildings concept is expected to be the meeting point of short-term development and demonstration in order to support legislative and regulatory measures for energy efficiency and enhanced use of renewable energy solutions within the building sector, which go beyond the draft Directive on the Energy Performance of Buildings.

The projects aim at a new approach for the design, construction and operation of new and/or refurbished buildings, which is based on the best combination of the double approach: to reduce substantially, and, if possible, to avoid the demand for heating, cooling and lighting and to supply the necessary heating, cooling and lighting in the most efficient way and based as much as possible on renewable energy sources and polygeneration.

Priority will be given to integrated research and demonstration projects aiming at improving substantially the energy performance of buildings at a large scale, transferring scientific knowledge into standards and industrial codes, and including the results of socio-economic research on integrated planning and behaviour of users. The projects must go clearly beyond the requirements of existing legislation and thus contribute to a further development of regulatory issues in this sector.

In setting this new approach, the integrated projects should bring together different skills and expertise (urban planners, architects, engineers, system integrators, investors, manufacturers, industry, energy suppliers, owners and renters, etc), take advantage of advanced communication and information tools, and propose new methodologies and techniques.

6.1.3.1.2.2. Polygeneration

This action aims to control the energy intensity in buildings and industry by stimulating the market take up of co-generation, tri-generation and polygeneration for individual houses, residential houses, tertiary buildings, and business and industrial parks. Polygeneration systems, appropriately integrated in the end use application, are expected to result in important energy efficiency increase of the overall system and in important reductions in installation/operating/maintenance costs.

Projects shall focus on innovative applications of energy technologies and advanced energy services. Projects should address in particular the situation in countries where the potential for improvement and better utilisation of the existing district heating infrastructure is significant. Projects should have short-term exploitation prospects (before 2010).

The potential for the market penetration of fuel cells into the stationary power, heat and cold production sectors has to be addressed through innovative integration into end use applications where fuel cells are able to deliver an added value for the customers and a reduced risk for the supplier. Renewable energy sources for the necessary hydrogen production can bring an added value for greenhouse gas emission reduction and will improve security of energy supply and the current energy mix.

There is a growing awareness that the ongoing liberalisation of the electricity sector requires a flexible approach to the provision and distribution of electricity. Polygeneration aims at improving the interaction between large and small suppliers of electricity, heat or cold in order to achieve overall improved efficiency and economics without reducing the quality and security of supply. It will lead to a new distribution of the operational risks (blackouts, unstable grids, etc.) between small and large electric utilities and end users.

New technologies, standardisation and new grid management tools should facilitate the access of small self-producers to the grid. Fuel flexibility (including renewables) ensures increased security in the decentralised energy market.

Research areas and topics for 2003 (Call 2003.SM)

Proposals for Integrated Projects and for Specific Targeted Research Projects are invited in the following area:

High performance eco- buildings:

In particular, support is envisaged for projects that focus on innovative solutions covering all aspects associated to the building itself, from planning, land and building characterisation, construction and life time operation in order to create a wide technological basis for future energy efficiency regulations for the buildings sector.

The main components of the projects should be:

- **innovative architecture aiming at low-energy demand buildings**, which is based on bioclimatic/ passive solar design combined with innovative building components;
- **integration of renewable energy technologies and efficient technological solutions** (including polygeneration), taking into account the total energy demand during the full life-cycle of the building and new energy management practices;
- **low energy construction and/or retrofitting materials, innovative components and technologies**;
- **innovative building management systems (BMS)** and monitoring performance criteria aiming at least-cost economic solutions based on a Life Cycle Analysis.

Projects should include the definition of goals (energy, environmental, behavioural), procedures (project management, integration and optimisation of planning, construction, maintenance, monitoring, facility management), and documentation (development of user manuals on different levels).

Specific Targeted Research Projects should address one or more of the above mentioned bullet points.

In Integrated Projects, the Commission is seeking the best combination of the above mentioned bullet points in an integrated approach of planning, building and use of the buildings, considering lifetime energy performance with improved cost to benefit ratio. The projects should also include support measures, for example addressing a) the upgrading of curricula and the continuous education of professionals involved in the building sector, b) changes to the planning structure aimed at enhancing building energy performance, c) EU-wide benchmarking and performance indicators for eco-building planning, construction and retrofitting, d) the preparation of guidelines for authorities in which these performance indicators are an integral part of the procedure of granting construction permissions and the basis for structures of energy pricing in order to favour energy saving behaviour of the end user.

The results obtained in each project shall accelerate the market penetration of cleaner and more efficient buildings.

Knowledge and data gathered within replicable examples should be spread widely in order to prepare the ground for more ambitious legislative, technological and market measures to encourage energy savings and sustainability in the buildings sector.

Polygeneration:

The polygeneration activity will not be opened for proposals.

Research areas and topics for 2004 (Call 2004.SM)

Managing energy demand and renewable energy supply in high performance communities:

Integrated Projects under this activity will be supported through a co-ordinated initiative ***"CONCERTO"- see section 6.1.3.1.1.2.***

Eco-buildings:

Proposals for only eco-buildings will not be considered in this call.

Polygeneration:

Proposals for only polygeneration will not be considered in this call.

6.1.3.1.3. Alternative motor fuels

Developing cleaner and more energy efficient transport-solutions is a priority to foster sustainable development and the Commission has set a political objective of 20% substitution by new/alternative fuels in the road transport sector in the year 2020. The three types of alternative motor fuels that potentially could reach a significant market are: *biofuels* (market coming to maturity up to 2010), *natural gas* (market coming to maturity in the years 2010 – 2015) and *hydrogen* (market coming to maturity in the years 2015 – 2020).

In this context, short to medium term activities will be concentrated on actions designed to identify, define and assess ways to remove existing technical, operational, organisational, and institutional barriers, which prevent those markets to take-off. In addition, research activities are needed to ensure that these new/alternative fuels, and the associated new concepts of energy efficient vehicles, will achieve significant market acceptance. Within these actions particular relevance will be given to knowledge generation for the definition and implementation of policy frames that will facilitate the 20% fuel substitution.

Taking into account that alternative fuels and clean vehicles address problems that are most apparent in cities, where it is easier to set up a new/alternative distribution and refuelling infrastructure, particular attention will be given to distribution, use and captive fleets in cities. In addition the scale of the activities should allow carrying out the assessment of the paths for alternative fuels to reach the market, in real life built environments.

Priority will be given to the following topics:

Large scale integration of alternative fuels into the transport system, particularly into urban transport focussing on the technical and non-technical assessment of alternative fuels powered vehicle fleets during their full life cycle. Appropriate fleets for integration could be: post distribution; waste collection; taxis; local delivery; airport fleets; and passenger vehicles. The key stakeholders for the establishment of large-scale experimentation and pilot application environments are local and regional authorities, working closely together with fleet operators, equipment manufacturers, technology providers, fuel suppliers and researchers.

Demonstration of innovative, cost-efficient and safe production, storage and distribution of alternative fuels from renewable energies, as for example new bio-mass resources (energy crops), or residues and clean waste streams. Assessment of the social and economical aspects associated to innovative infrastructure for alternative fuels.

Demonstration of new ways of using alternative fuels in efficient vehicles, with particular attention to high blends of bio-fuel (significantly higher than 5%), fuel flexible vehicles, and the use of bio-fuels for fuel cells.

Innovative strategies and tools to monitor and stimulate market demand for alternative motor fuels designed to ensure a timely removal of organisational, planning, institutional and financial barriers, and addressing issues such as how to focus resources and how to develop and manage the market transition processes. In particular, user knowledge and acceptance of alternative fuels should be part of these strategies.

Assessment and monitoring of new and ongoing alternative fuel research activities from safety, economic, environmental (emission and noise), social perspectives, including the liaison with relevant national, regional and local and non-European projects.

In addition to the defined research topics, integrated approaches to Clean Urban Transport will be developed under CIVITAS II.

CIVITAS II: Testing implementation and transition strategies for Clean Urban Transport *combining alternative fuels and energy efficient vehicles with transport policy* measures. CIVITAS II will be jointly executed under the Sustainable Energy and the Sustainable Surface Transport sub-priority themes, integrating energy and transport measures in a balanced way.

The policy objectives set in the White Paper and the Green Paper mean for urban transport that, against current unsustainable trends of an overall growth in urban mobility and of an ever-increasing role of the car in urban mobility, bold packages of measures need to be introduced and tested in European cities.

Research will deliver a better understanding of the organisational, institutional and financial frameworks required to successfully introduce innovative solutions and bold changes towards clean urban transport, and will demonstrate the feasibility of such targeted and integrated approaches.

Research areas and topics for 2003 (Call 2003.SM)

This call will address the research topics above described with the exception of CIVITAS II. Proposals should focus on *bio-fuels* and *hydrogen*.

a) Proposals are invited for Integrated Projects that may address in an holistic manner the research topics above described covering the whole alternative fuels chain, the so-called "well to wheel" approach.

b) Proposals are invited for Strategic Targeted Research Projects when one or two of the described research topics are addressed.

c) Co-ordination Actions and Specific Support Actions are invited for the above-described topics and in particular for assessing and monitoring new and ongoing alternative fuels initiatives.

Research areas and topics for 2004 (Call 2004.SM)

CIVITAS II – *a joint initiative with Thematic priority 1.6.2 (sustainable surface transport).*

a) Proposals are invited for Integrated Projects in the following area:

Objectives and problems to be solved

CIVITAS II (CIty–VITAlity–Sustainability) addresses :

(1) Ambitious cities which should test implementation strategies for innovative and bold integrated packages of transport policy and fuel/vehicle-technology measures that are able to maintain or improve the existing modal split in favour of 'alternative modes'.

(2) In particular, cities in the Accession Countries, which should concentrate on transition-strategies for innovative and bold integrated packages of transport policy and fuel/vehicle-technology measures that are able to maintain existing modal splits despite the rapid increases in car-ownership.

Work to be done and ways for implementation

Each proposal should combine:

(1) The integration of alternative fuels into the city transport system. Key elements of this integration are:

- Innovative energy-efficient, cost-effective and clean public and/or private vehicle fleets[3] for passenger or freight transport (*minimum Euro-IV standard*) using alternative fuels
- and the necessary energy infrastructure, in particular for the storage of the alternative fuels and the specific fuelling equipment);

The focus should be on short/medium term alternatives, i.e. innovative bio-fuels and natural gas, including hybrid vehicles that use these fuels.

with a wider package of

(2) Policy measures and tools in order to cover both the transport demand and supply side *(see Work Programme 1.6.2 – sustainable surface transport – for more details)*.

Emphasis on medium sized cities; lead and follower cities

Particular emphasis will be put on medium-sized cities (less than 500 000 inhabitants in the city-region). Proposals should be prepared by clearly committed pairs of city-led consortia, with each city being located in a different country. Each pair should be made up of a lead site addressing a maximum number of categories of measures and a follower site focussing on one or two categories. Participation by cities from Accession Countries, especially in the role of lead cities, is particularly encouraged. The Commission may decide to cluster and/or merge successful proposals.

Clear evidence of political consensus and support should be provided, as well as of the necessary collaborative frameworks and partnerships. The research should build upon the large-scale application of innovative technological and non-technological solutions.

Expected results

Coherent recommendations on the impacts of radical change in urban transport policy, as well as on the indirect effects on other sectorial policies. Special attention should be paid to analysing the process of preparing and implementing policy change.

This requires a robust impact assessment and evaluation plan, based upon a do-nothing scenario, covering a set of a clearly defined 'technical' indicators and targets as well as other relevant issues such as citizen's response and acceptance, enforcement, spatial impacts, economic and financial feasibility, institutional setting, etc. The demonstrators should run their own evaluation and dissemination programmes at local and national levels. Active participation in the CIVITAS Forum as well as in other activities organised by the CIVITAS Initiative (see www.civitas-initiative.org) is expected.

[3] A vehicle fleet is a coherent group of vehicles operated by a single operator in a single urban area.

b) Proposals are invited for Specific Support Actions in the following area:

A separate accompanying action will be responsible for the development and implementation of an independent pan-European cross-site evaluation programme, with full independence of but in close co-operation with the demonstrators, on the basis of before and after data that will be provided by the demonstration sites.

The action will also take care of independent monitoring, and providing specialist and independent advice to the Commission, of the progress in the implementation of the demonstrations. It will also be supported by an advisory committee that includes experts nominated by Member States and associated States. The action will develop and implement a pan-European programme for the valorisation of results, dissemination and awareness raising activities, in close co-operation with the demonstration sites.

6.1.3.2. Research activities having an impact in the medium and longer term

In accordance with the principle of focussing research effort, the following sections 6.1.3.2.1 to 6.1.3.2.5 first describe the main objectives to be achieved and the strategically important areas in which research should be concentrated. They then go on to provide details of the technical content of the first call (Call 2003.ML) and an indicative content for the second call (Call 2004.ML). *Research areas described below but not included in the first and second calls for proposals may be included in subsequent calls.*

Where appropriate, quantified targets are set out in the Work Programme. They are ambitious long-term targets (15-20 years) and not easy to achieve. Nevertheless, they are a clear indication of the scale of achievements to which an individual proposal should aspire.

6.1.3.2.1. Fuel cells, including their applications

Research is needed to reduce the cost and improve the performance and durability of fuel cell systems for stationary, transport, and portable applications, to enable them to compete with conventional combustion technologies. This will include the optimisation and simplification of fuel cell subsystems and components as well as testing and characterisation protocols. *The long-term target is to achieve an attractive return on investment by 2020 for many applications.*

For fuel cells, the strategically important areas in which research should be concentrated are : **the development of competitive fuel cell and related technologies for stationary and transport applications** (*covering both low temperature fuel cell systems, including stacks, fuel processors, etc. and related technologies such as reversible fuel-cell/ electrolysers and high temperature fuel cell systems. The emphasis for RTD will be on materials, processes and component level development, aimed at improving performance and durability, whilst also reducing costs.*) and **fuel cell systems applications** (*research will concentrate on systems and integration for various applications, exploiting, where appropriate, synergies between applications, e.g. technologies for multi-fuel capability. Research will include system simplification, simulation and modelling, optimisation and cost reduction of auxiliary components and balance of plant. The types of application concerned are : small and medium size, mainly low temperature, fuel cells, power generation in the range of 0.5 - 5 MW, development of portable power systems and Auxiliary Power Units, fuel cell systems for small road vehicles and fuel cell systems for heavy duty road, marine and railway transportation.*).

Research areas and topics for 2003 (Call 2003.ML)

a) Proposals are invited for Integrated Projects and Networks of Excellence for the following topics:

- **Development of low cost, competitive high temperature fuel cell systems for clean, safe, durable and cost-effective decentralised power generation, combined heat/cold and power and mobile applications, covering power ranges from a few kW up to a few MW.** The main targets are to provide solutions for future commercial Fuel Cell systems with a cost of less than 1000 €/kW (150€/kW for automotive Auxiliary Power Units) and with a durability of more than 40000 h. Other specific challenging targets should be defined according to the market segments considered. Research will integrate elements of materials, manufacturing processes, new system design, grid connection, fuel flexibility, testing, energy/environment life cycle

analysis, recycling and disposal. Preference will be given to proposals which cover as many technical and socio-economic issues as appropriate to achieving synergies between component technologies, balance of plant and system integration for various applications.

- **Development of cost-competitive solid polymer fuel cell systems and components for stationary and transport applications.** The main targets are to provide solutions for future commercial Fuel Cell systems with a cost of less than 100 €/kW for stationary and 50 €/kW for transport applications (for series production), and with a durability of more than 30000 h for stationary and 5000 h for transport applications. Other specific challenging targets (volume, weight, etc.) should be defined according to the market segments considered, e.g. Auxiliary Power Units for road transport. Research will integrate elements of modelling, materials, catalysis, on-board fuel processors, control system interfaces (e.g. in vehicles), testing, energy/environment life cycle analysis, recycling and disposal. Preference will be given to proposals which cover as many technical and socio-economic issues as appropriate to achieving synergies between component technologies, system integration and fuel processing for various applications.
- **Generation of new knowledge in key fundamentals for low cost sustainable materials, processes, components and systems for Proton Exchange Membrane (PEM) and Direct Methanol (DM) Fuel Cells.** The objective is to improve knowledge in materials physics and electro-chemistry, new manufacturing routes, modelling and cost-benefit analysis to overcome the technical and economic barriers to the development and deployment of low temperature fuel cells. A widespread co-operation between the EU and non-EU research communities would be expected. *Proposals for Networks of Excellence are particularly invited to address this topic.*

b) Proposals are invited for Specific Targeted Research Projects in the following areas:

- **Development of advanced, safe and clean fuel cell systems for small portable applications** (i.e. few hundred watts - provided that the technology has the potential to be transferred to larger applications e.g. Auxiliary Power Units).
- **Development and validation of the "next generation" of advanced computational models and simulation tools for fuel cell systems analysis** (i.e. thermodynamics, reactor performance, heat integration, etc. Effort should focus on industrial applications and should have the involvement of the industry sector).

c) Proposals for Co-ordination Actions and Specific Support Actions are invited in the areas described in Section 6.1.3.2.1 above.

Indicative research areas and topics for 2004 (Call 2004.ML)

Proposals for Specific Support Actions only are invited in all of the areas described in Section 6.1.3.2.1 above.

6.1.3.2.2. New technologies for energy carriers/transport and storage, in particular hydrogen

Hydrogen and electricity have the potential to become the principal, interlinked energy carriers in a future sustainable energy economy. Together they can provide a unique pathway for gradually becoming progressively less dependent on fossil fuels, reducing greenhouse gas and pollutant emissions and increasing the contribution of renewable energy sources.

In the long term, hydrogen will play a key role in adapting energy supply to energy demand as hydrogen has the potential for large-scale, even seasonal, energy storage. The transition towards future sustainable energy networks based on a large share of renewable and distributed generation requires the preparation of the European energy system for the large-scale integration of Distributed Energy Resources (DER). This concept will play a key role in transforming the conventional electricity transmission and distribution grid into an *unified and interactive energy service network* using common European planning and operation methods and systems.

For hydrogen, the strategically important areas in which research should be concentrated are : **clean production** (*development, analysis and comparative assessment of cost-effective pathways for hydrogen production from existing and novel processes*), **storage** (*exploration of a wide range of large and small scale systems*), **basic materials** (*electrochemical materials for electrolysers and fuel processors, materials for hydrogen storage and hydrogen separation and purification*), **safety** (*over the complete fuel chain, including pre-normative RTD aimed at identifying safety critical events and the preparation of regulations and safety standards at EU and global level*), **distribution** (*development, validation and analysis of alternative technology options for hydrogen distribution networks and fuelling infrastructure both for large scale and local hydrogen economies*) and **preparing the transition to a hydrogen energy economy** (*identification and assessment of barriers, pathways and options and development of strategies leading to the implementation of a hydrogen economy*).

For electricity, the strategically important areas in which research should be concentrated are : **a new approach for large-scale implementation of Distributed Energy Resources (DER) in Europe** (*design, development and validation of novel components and DER solutions needed for future interactive energy service networks*), **energy storage technologies and systems for grid-connected applications** (*innovative energy storage concepts to facilitate the large-scale penetration of DER*) and **the development of key enabling technologies** (*for distributed energy networks with high power quality and security of service, including development of low-loss cables for transmission systems and high temperature superconductor based components for electrical applications, such as fault current limiters, motors, transformers etc*).

Research areas and topics for 2003 (Call 2003.ML)

a) Proposals are invited for Integrated Projects and Networks of Excellence for the following topics:

- **Identification, development and validation of cost-effective technologies for centralised and de-centralised hydrogen production and purification from fossil, renewable, and other sources.** The objective is to provide an integrating framework for the development and life cycle assessment of promising candidate pathways for hydrogen production. Integration should centre on a common socio-economic and technical benchmarking environment that enables a co-ordinated and harmonised approach to technology development, validation and life cycle energy and environmental assessment. Development/validation of production processes should include hydrogen from : fossil fuels (co-ordinated with efforts on CO_2 sequestration); bio-fuels and bio-gas (not including the bio-mass processing covered under 6.1.3.2.3), electrolysis (especially relating to Renewable Energy Sources); other hydrogen processes, such as thermo-chemical, or other novel routes. Research will include elements of conversion technologies, process modelling, design, development and optimisation, reformate purification; (*Note that integrated on-board fuel processors/fuel cell systems for vehicles will normally be covered under section 6.1.3.2.1.*)

- **Evaluation and development of safe, cost-effective hydrogen storage media and related infrastructure for stationary and transport applications.** The main targets are to develop the next generation storage systems using optimised existing systems (i.e. pressurised, cryogenic), latest and new materials (e.g. new metal hydrides) and novel concepts (e.g. nanostructures), especially for on-board transport applications, to develop storage media for buffering Renewable Energy Sources and to provide the framework for a cost-effective infrastructure for the transport sector, including refuelling equipment. Effort should include: up-scaling of production processes for storage media, related safety studies and pre-normative research, including aspects leading to certification and techno-economic evaluations.

- **Preparing for hydrogen as an energy carrier in next generation sustainable energy systems.** The research should identify potential barriers inhibiting the development of hydrogen as an energy carrier and define a roadmap to a European hydrogen economy (including cost effective transition strategies from existing fuel infrastructures). Research will include technology mapping, analysis of socio-economic and technical barriers to the hydrogen economy, developing alternative scenarios for pathways and timelines to a hydrogen energy economy, developing decision support tools, research to support harmonised standards and regulations for hydrogen in infrastructure, stationary and transport applications – having regard to global dimension. Integrating activities will normally engage a range of stakeholders including industry, energy companies, utilities, research organisations, and public authorities, establishing a platform for dissemination and for promoting public understanding and acceptance. EU Education and training requirements should be addressed. Given the global significance for the developed and developing worlds, channels for international co-operation should be developed.

- **Development of a robust and reliable framework for the assessment of the safety of hydrogen technologies and applications and for the harmonisation of testing procedures and Quality Assurance standards in the EU.** The main objective is to facilitate the development of a common set of EU safety codes and Quality Assurance standards, which allow the safe and cost-efficient development and introduction of hydrogen technologies and applications while promoting their public acceptance. Important aspects to be addressed are: risk assessments of the technologies for hydrogen production, transport, pipeline transmission, storage and utilisation, integration of research efforts on hydrogen safety technologies associated to different applications, harmonisation of testing procedures and methodologies, compatibility between national and international standards, promotion of public awareness and inter-institutional training programmes on hydrogen safety. Efforts could address the requirements for establishing a European Hydrogen Safety Centre and interfaces with international initiatives in this area.

- **New demand driven solutions for large scale implementation of Distributed Energy Resources (DER) in Europe.** The objective is to design, develop and validate systems and approaches allowing the large-scale penetration of DER incorporating the needs of future market requirements. The work should be based on a demand driven approach and cover research and technological validation of solutions for the optimal operation and integration of a large number of distributed generators, including renewables. The main expected results should be a set of specifications for distributed generators and their control interface to the distribution network of the future and to formulate, develop and test new tools and techniques for the management of distribution networks with a high penetration of DER. *Proposals for Integrated Projects are particularly invited to address this topic.*

- **Novel concepts and advanced components for power transmission and distribution networks with high Distributed Energy Resources (DER) penetration.** The aim is to develop and test new concepts and components for future intelligent electricity networks (for mainland and island systems) based on a DER model, integrating advanced power electronic components and new Information and Communication Technology (ICT) concepts. Results should enable operators of advanced networks to start planning the utilisation of innovative grid management tools in their businesses, increasing quality and reliability of supply and reducing environmental impacts. Furthermore, delivered specifications should allow manufacturers of equipment to plan and validate industrial production of new grid control and management devices.
- **Advanced energy storage systems for RES.** The objective is to develop technologies and systems for the storage of electricity for grid-connected applications enabling the increased penetration of renewable and distributed generation of electricity in new distributed electricity networks. RTD should also consider the analysis of storage system performance (in terms of lifetime, system lifetime cost, reliability, safety and recyclability of materials, including life cycle analysis), the benchmarking of technologies (such as batteries, reversible fuel cells, supercapacitors, flywheels and SMES, for storing electricity in grid-connected applications) and pre-normative research.

b) Proposals are invited for Specific Targeted Research Projects in the following areas:

- **Hydrogen** - ***exploration of novel unconventional routes for potentially cost-effective hydrogen production*** (e.g. thermo-chemical cycles, photochemical water splitting, photobiological processes).
- **Hydrogen** - ***assessment of advanced components and systems for specific hydrogen safety critical functions*** (e.g. metering, detection and control, interaction with materials, flammability, etc).
- **Electricity** - ***transmission systems*** (advanced systems for stability and control, as well as the development of low-loss cables).
- **Electricity** - ***innovative energy storage technologies for grid-connected applications*** (new concepts for energy storage technologies, where applicable exploiting the synergies with transport applications).
- **Electricity** - ***development of devices based on high temperature superconductors (HTS)*** (development and validation of HTS based components for electrical applications, such as fault current limiters, motors, transformers, etc).

c) Proposals for Co-ordination Actions and Specific Support Actions are invited in the areas described in Section 6.1.3.2.2 above.

Indicative research areas and topics for 2004 (Call 2004.ML)

Proposals for Specific Support Actions only are invited in all of the areas described in Section 6.1.3.2.2 above.

6.1.3.2.3. New and advanced concepts in renewable energy technologies

Renewable energy technologies have, in the long term, the potential to make a large contribution to the EU and world energy supply. The main targets are to decrease the cost of electricity and fuel to competitive levels through developing highly efficient concepts

and bringing about major cost reductions in the entire production chain, as well as improving the reliability, safety, availability and durability of renewable energy systems.

For **photovoltaics**, the strategically important areas in which research should be concentrated are : **innovative concepts and fundamental materials research for the next generation of PV technologies** (*e.g. organic or hybrid solar cells*), **thin film PV technology** (*development of cost-effective PV cells and modules based on new and improved technologies and materials*), **PV processing and automated manufacturing technologies** (*to reduce the costs and improve materials usage in the manufacture of PV cells and modules*), **PV components and systems – balance of systems** (*research into components and their integration into the overall system*) and **the research for innovative applications of PV in buildings and the built environment** (*to develop integrated PV module systems which are configured for ease of mounting on building roofs and facades, hybrid PV/heating systems*). The main targets are to: decrease the investment cost for PV systems to 1-2 €/Wp (with a module cost of 0.5-1 €/Wp) by 2015 and to decrease PV electricity cost to below 0.1 €/kWh by 2015.

For **biomass**, the strategically important areas in which research should be concentrated are : RTD for **reliable, efficient and cost-effective combustion technologies** (*with significant reduction of atmospheric pollutants, operation of large scale systems with multifuel resources including co-firing, self-running processes for small scale systems using standardised feed-stock)*), **reliable and cost-effective gasification systems** (*aimed at the efficient production of electricity and clean hydrogen-rich gas*), and **new methods for cost effective production of clean biofuels to be used in combustion engines and fuel cells** (*primarily from ligno-cellulosic feedstock*) and **energy from bio-residues and energy crops** (*innovative, low emission waste-to-energy and crop-to-energy concepts and technology development*). The main targets are: to decrease the cost of electricity production with biomass to 0.05 €/kWh by 2015-2020 and to decrease the cost of biofuels to 10 €/GJ (0.036 €/kWh) by 2020.

For **other renewable energy sources** having the potential to contribute significantly to the EU energy supply in the medium-to-long term, the strategically important areas in which research should be concentrated are : **wind** (*research and integration of efforts needed to solve the challenges of on- and off-shore systems by developing innovative new materials, enhanced aerodynamics, and novel designs for structures and foundations, along with associated pre-normative research. Methods and techniques that reduce the uncertainty of costs and production, on the basis of more accurate and cheaper measurement and modelling of site climate conditions - both for resource assessment and design*), **geothermal** (*to verify the technical feasibility and cost-effectiveness of electricity production from enhanced geothermal systems, through innovative research into exploration, resource assessment and management techniques, cheaper and more advanced drilling and stimulation technologies, and more efficient power cycles*), **ocean** (*new concepts to improve the availability and predictability of deliverable energy, coupled with better installation and production methods, and harmonised testing methods to support the development of cheaper and safer on- and offshore systems*), and **concentrated solar thermal** (*for electricity and heat generation: new concepts for low-cost, efficient and reliable components and systems; for non-electrical processes: high temperature chemical solar reactors for the production of hydrogen and other high-value materials*). The main target is to decrease the cost of electricity production with these RES to 0.05 €/kWh by 2020.

Research areas and topics for 2003 (Call 2003.ML)

a) Proposals are invited for Integrated Projects and Networks of Excellence for the following topics:

- **Research, development and validation of thin-film PV technologies with higher efficiency/cost ratio.** The objective is to develop manufacturing techniques for stable, high-efficiency, low-cost and environmentally friendly thin-film solar cells and large area modules using new and promising materials and concepts. The research should cover materials science, processing technologies, PV module production, socio-economic aspects and aim at applications for building integration and autonomous solar electricity generation.
- **Research and development of crystalline Si PV modules costing below 1€/Wp, with clean manufacturing processes and recycling techniques.** The aim is to achieve a significant cost reduction in crystalline Si PV modules, with efficient use of raw materials and environmental sustainability of the processes and products involved. The expected RTD efforts in this topic should cover production of solar grade silicon feedstock, solar cell manufacturing, process control and automation with emphasis on thin wafers, module manufacturing, and recycling techniques for end-of-life products.
- **Research and development of a new generation of high efficiency PV through better utilisation of the solar spectrum.** The aim is to achieve significant improvements in the efficiency of PV cells, laying the foundations for a future breakthrough in PV technology. The research should cover materials research (including the use of nanotechnology), cell structure developments and manufacturing technologies. *Proposals for Networks of Excellence are particularly invited to address this topic.*
- **Research and development of cost efficient biofuel production systems from ligno-cellulosic biomass feedstock.** The aim is to optimise the most promising thermochemical and enzymatic pathways in order to achieve high yields and high quality fuels for the automotive sector. Research should cover feedstock logistics and process optimisation from laboratory to pilot-scale (e.g. enzymatic hydrolysis, efficient gas treatment and conditioning, process integration, analysis of the syngas generation) and a comparative assessment of the potential of the different approaches to produce competitive biofuels, including resources, process development, socio-economic aspects, as well as environmental benefits.
- **Research, development and optimisation of energy efficient, cost-effective technologies for the production of hydrogen rich gas using multiple biomass feedstocks, including biomass residues/wastes.** Proposals should include one or more of the most advanced processes, from laboratory to pilot-scale, for hydrogen production from biomass (e.g. biomass steam gasification, supercritical water gasification, anaerobic digestion), with the potential to meet a hydrogen cost target around 10€/GJ. Important aspects of the research are considered to be the development and optimisation of advanced processes for the production of hydrogen, downstream research to develop hydrogen-rich end products, component development and prototype testing. Centralised and decentralised production infrastructures and biomass supply aspects should be considered.
- **Overcoming barriers to the development of bioenergy production systems.** The main objective is the creation of an integrated structure, which will explore the synergies and allow the sharing of research infrastructures and research personnel in one or more of the most relevant areas of bioenergy (e.g. biofuels for transport, Combined Heat and Power). Research should cover the technological as well as the

economic, social and environmental sustainability aspects of the entire bioenergy production chain. *Proposals for Networks of Excellence are particularly invited to address this topic.*

b) Proposals are invited for Specific Targeted Research Projects in the following areas:

- **Organic solar cells** (Research into materials and photochemistry for very low cost PV).
- **PV Concentration** (Research on high (> x500) concentration optical elements and related high performance solar cells).
- **Application of PV in buildings and habitat** (Research should concentrate on innovative concepts and novel system designs for the built environment).
- **PV systems including megawatt-size PV plants** (Research on grid-connected PV system design, cost-effective balance of system components).
- RTD for **reliable, efficient and cost-effective biomass combustion technologies, with significant reduction of atmospheric pollutants** (large scale systems with multi-fuel resources including co-firing; self-running processes for small scale systems using standardised feed-stock).
- **Innovative methods for cost effective production and coupling of biofuels to fuel cells.**
- **Energy from bio-residues and energy crops** (innovative, low emission waste-to-energy and crop-to-energy concepts and technology development).
- **Wind** (new concepts and designs, innovative materials, enhanced aerodynamics, measurement and testing methods).
- **Ocean** (New concepts to improve the availability and predictability of deliverable energy, coupled with better installation and production methods, and harmonised testing methods to support the development of cheaper and safer on- and offshore systems).
- **Concentrated solar thermal** (New concepts for low-cost, efficient and reliable components and systems for electricity and heat generation; high temperature chemical solar reactors for the production of hydrogen and other high-value materials).
- **Geothermal** (Innovative concepts for cost-efficient exploration, assessment, development and management of potentially exploitable enhanced geothermal systems).

c) Proposals for Co-ordination Actions and Specific Support Actions are invited in the areas described in Section 6.1.3.2.3 above.

Indicative research areas and topics for 2004 (Call 2004.ML)

Proposals for Specific Support Actions only are invited in all of the areas described in Section 6.1.3.2.3 above.

6.1.3.2.4. Capture and sequestration of CO_2, associated with cleaner fossil fuel plants

Global and EU energy supply will, for the foreseeable future (2015 - 2020), be dominated by fossil energy sources. However, their CO_2 emissions are a major drawback in the context of global climate change. The challenge is therefore to be able to use these fossil fuels whilst eliminating CO_2 through cost-effective capture and sequestration and at the same time maintaining EU industrial competitiveness in global markets. *Targets: reduce*

the cost of CO_2 capture from 50-60 € to 20-30 € per tonne of CO_2 captured, whilst aiming at achieving capture rates above 90%, and assess the reliability and long term stability of sequestration.

For capture and sequestration of CO_2, the strategically important areas in which research should be concentrated are : **post-combustion CO_2 capture** (*RTD on new and retrofit options for post-combustion capture of CO_2 and suitability for subsequent sequestration options.*), **pre-combustion CO_2 capture** (*RTD on pre-combustion CO_2 capture options such as de-carbonisation and oxy-fuel techniques. RTD on suitability of captured gases for subsequent sequestration options will form part of this research.*), **geological sequestration of CO_2** (*RTD aiming at safe, reliable and stable cost-effective sequestration options such as saline aquifers, enhanced coal bed methane and enhanced oil recovery. Sequestration potential, long term geological stability and geochemical interactions, public acceptance and cost are key issues.*), and **chemical/ mineral sequestration of CO_2** (*Comparison of the available options, as well as other innovative solutions and uses of the products. Public acceptance, sequestration potential, transport and mining activities, environmental impact, applied chemistry and kinetics are key issues.*).

Research areas and topics for 2003 (Call 2003.ML)

a) Proposals are invited for Integrated Projects and Networks of Excellence for the following topics:

- **Development of pre-combustion capture technologies for CO_2.** The main objectives are the validation of the technologies developed in a reduced size power plant, of the order of a few megawatts or on a side stream of a similar flow from an existing gasification power plant, the verification of operational and economic viability, the achievement of sufficient fuel flexibility and the demonstration of how the concept can produce hydrogen from fossil fuels. Important elements include integration with a possible subsequent sequestration and technological research such as the development of new power cycles based on partial combustion, including gasification, oxyfuel combustion or other innovative ideas.
- **Development of post-combustion capture technologies for CO_2.** The main objectives are to assess techno-economic feasibility and gain hands-on experience with a pilot plant delivering CO_2 for geological sequestration, to supply sufficient CO_2 volumes for subsequent meaningful sequestration in terms of research and demonstration and to demonstrate the reliability and stability of sequestration. Important elements include technological research such as process simplifications, novel membranes and other separation techniques and the development of new sorbents and solvents, and integration with a geological sequestration facility, in an aquifer, or for enhanced oil or gas recovery or coal bed methane extraction.
- **Development of CO_2 capture and geological sequestration as a viable option for CO_2 mitigation**. The main aims could be: to integrate power generation RTD activities with CO_2 capture activities. Research should include both pre-combustion and post-combustion research, with a clear emphasis on cost reduction aspects. The development of monitoring techniques of the CO_2 in geological sequestration together with the assessment of: safety and reliability, potential capacities, socio-economic viability, environmental impact of geological sequestration options and the benchmarking of specific sequestration conditions in different European regions. *Proposals for Networks of Excellence are particularly invited to address this topic.*

b) Proposals are invited for Specific Targeted Research Projects in the following areas:

- **Chemical/ mineral sequestration of CO_2** (Comparison of the available options, e.g. magnesium, silicon and other carbonates, as well as other innovative solutions and uses of the products. Public acceptance, sequestration potential, transport and mining activities, environmental impact, applied chemistry and kinetics are key issues).
- **Transport of CO_2** (Work is required on transport facilities and costs, on the networks needed for large scale capture/storage, on the materials implications and on the safety and reliability of transport systems/networks).
- **CO/H_2 and/or CO_2/H_2 separation in pre-combustion capture** (Separation of CO/H_2 and/or CO_2/H_2 using highly innovative techniques).

c) Proposals for Co-ordination Actions and Specific Support Actions are invited in the areas described in Section 6.1.3.2.4 above.

Indicative research areas and topics for 2004 (Call 2004.ML)

Proposals for Specific Support Actions only are invited in all of the areas described in Section 6.1.3.2.4 above.

6.1.3.2.5. Socio-economic tools and concepts for energy strategy

Socio-economic research related to energy RTD will be systematically integrated into research carried out in the technological areas described in the preceding sections. Nevertheless, common and harmonised tools should be developed to tackle the complex social and economic issues of new energy technologies. Competition with conventional energy technologies in a medium to long term perspective, questions of socio-environmental damages of energy production and consumption, of the implementation of new and emerging energy technologies into society and of shaping the future sustainable energy system should be covered. Foresight exercises should be carried out to build up strategies for energy governance as well as to define alternative ways to achieve societal objectives.

For socio-economic tools and concepts, the strategically important areas in which research should be concentrated are[4] : **energy external costs** (*methodological development to better quantify the social and environmental damages of energy production and consumption in the EU, in the Accession States and in the Mediterranean area*), **social issues related to implementation of medium and long term energy technologies** (*including economic aspects, consumer preferences/ behaviour, social acceptance and influence of private sector choices. The socio-economic impacts of sustainable policies and measures should also be covered for the EU and in the world perspective, including developing countries*), **quantitative and qualitative forecasting methods** (*Energy-Economy-Environment forecasts for the long-term (2020-2030) and very long-term (2050-2100) should deal with resource depletion, climate change and radioactive waste management and other issues at the EU and world-level. Integration of energy, economy and environment aspects, comparison of various models and alternative scenarios will enable the assessment of the evolution of sustainable development*) and **ethics in energy** (*the aim should be to analyse the implications and produce guidelines for ethical*

[4] Research under this area will complement and take into account the research to be carried out under Chapter 8.1 "Policy-orientated research".

governance taking into account all energy policy issues and covering the entire energy chain).

Research areas and topics for 2003 (Call 2003.ML)

a) Proposals are invited for Integrated Projects and Networks of Excellence for the following topics:

- **Quantification of energy externalities**, including harmonisation at EU-level, new technologies and categories of socio-environmental costs, and long-term strategy for internalisation. The main objective is to improve the analysis and develop methodologies for externalities (covering also the developing countries) coming from the production and use of energy. Socio-economic measures such as acceptability, and forecasting methods should complement the external costs quantification.

b) Proposals are invited for Specific Targeted Research Projects in the following areas:

- **Social issues related to implementation of medium and long term energy technologies** (evaluation of the social and economic impacts of the market penetration of new energy technologies).
- **Quantitative and qualitative forecasting methods** (tools for assessing long and very long-term trends related to sustainable development, highlighting the role of new energy technologies).

c) Proposals for Co-ordination Actions and Specific Support Actions are invited in the areas described in Section 6.1.3.2.5 above.

Indicative research areas and topics for 2004 (Call 2004.ML)

Proposals for Specific Support Actions only are invited in all of the areas described in Section 6.1.3.2.5 above.

6.1.4.Links to Other Research Topics

Activities will be integrated and co-ordinated, as necessary, within and between actions and activities in this and other priorities, including the activities of the Joint Research Centre and national programmes.

Co-ordination within this priority thematic area (No. 6)

The potential for future collaboration will be closely monitored in the following areas :

- Priority 6.2 : Sustainable surface transport;
- Priority 6.3 : Global change and eco-systems.

Proposals that address more than one thematic area will be accommodated by the Commission, provided the proposal addresses areas covered by this work programme. The general principle for the submission of proposals is:

- Proposals must clearly address the objectives and priorities set out in the relevant work programme sections and should be submitted to the priority area to which they are most closely linked. For example, generic RTD on fuel cells (stacks, catalysis, components, systems, …) is tackled in the medium to long term priorities of sustainable energy systems; research for the integration of stacks, components and systems into transport vehicles should be dealt with by sustainable surface transport.

Co-ordination with other priority areas for research

The potential for future collaboration will be closely monitored in the following areas :

- Priority 2 : Information Society technologies;
- Priority 3 : Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices;
- Supporting policies and anticipating scientific and technological needs;
- Support for the co-ordination of national activities.

Proposals that address more than one thematic area will be accommodated by the Commission, provided the proposal addresses areas covered by this work programme. The general principle for the submission of proposals is:

- Proposals which intend to develop a new technology (e.g. information and communication, biotechnology, nanotechnology, …) should seek funding from the priority area most directly linked with such a technology; proposals aimed at the use or integration of a given technology in RTD activities to pursue the objectives of "Sustainable "Energy Systems" should be addressed to this priority.

In addition, it should be noted that energy related RTD may also be carried out in the context of the Specific Programme "Structuring the European Research Area", for example in the areas of "*horizontal research activities involving SMEs*", "*specific measures in support of international co-operation*", "*human resources and mobility*", "*research infrastructures*", and "*science and society*".

6.1.5.Implementation Plan and Related Issues

6.1.5.1. Indicative timetable and budget attribution (roadmap)

It is intended to implement the Programme through a series of Calls for Proposals, with fixed closing dates. Table 1 shows the indicative roadmap for the whole of the Sixth Framework Programme.

Specific details of the calls for proposals covering the first two years of the programme are provided in Sections 6.1.6 (Call information) and 6.1.3 (Technical content).

6.1.5.2. Evaluation criteria

The set of criteria applicable to this work programme, together with the corresponding evaluation thresholds, is given in Annex B. In addition, Annex B outlines how the following will be addressed: gender issues, ethical and/or safety aspects, and the education dimension.

Table 1 : Roadmap

The following table shows the indicative timetable and budget allocation for the whole of the duration of the Specific Programme. In addition, for each call, the technical areas open and the types of instrument* to be used are also shown.

	Call Identifier :	**2003.SM**	**2003.ML**	**2004.SM**	**2004.ML**	**2005.SM**	**2005.ML**	**2006.SM**	**2006.ML**
	Planned launch date :	17 December 2002		June 2003	Sept 2003	June 2004	Sept 2004	June 2005	Sept 2005
	Planned closing date :	18 March 2003		December 2003		December 2004		December 2005	
Research activities having an impact in the short and medium term									
6.1.3.1.1.1	***Cost-effective supply***	IP, STRP, CA, SSA	-	-	-	IP, STRP, CA, SSA	-	IP, STRP, CA, SSA	-
6.1.3.1.1.2	***Large-scale integration***	CA, SSA	-	IP, STRP, CA, SSA	-	-	-	IP, STRP, CA, SSA	-
6.1.3.1.2.1	***Eco-buildings***	IP, STRP	-	IP only	-	-	-	IP, STRP, CA, SSA	-
6.1.3.1.2.2	***Polygeneration***	-	-	IP only	-	IP, STRP, CA, SSA	-	IP, STRP, CA, SSA	-
6.1.3.1.3	***Alternative motor fuels***	IP, STRP, CA, SSA	-	IP, SSA	-	IP, STRP, CA, SSA	-	-	-
Research activities having an impact in the medium and longer term									
6.1.3.2.1	***Fuel cells***	-	All instr.	-	SSA only	-	All instr.	-	SSA only
6.1.3.2.2	***Energy carriers***	-	All instr.	-	SSA only	-	All instr.	-	SSA only
6.1.3.2.3	***Renewables***	-	All instr.	-	SSA only	-	All instr.	-	SSA only
6.1.3.2.4	***CO_2 sequestration***	-	All instr.	-	SSA only	-	All instr.	-	SSA only
6.1.3.2.5	***Socio-economic tools***	-	All instr.	-	SSA only	-	All instr.	-	SSA only
Indicative % of the overall budget		10%	24.5%	13%	0.5%				
Indicative Budget		82 M€	198 M€	107 M€	4 M€				
Tentative % for the New Instruments		65%	65%	65%	0%				

Notes: *Dates and budget figures are indicative. Applicants should verify the closing dates in the text of the relevant call, as published in the Official Journal.*

The proposals will be evaluated and selected according to the guidelines and procedures laid down in the Guidelines on Proposal Evaluation Procedures, using the single stage submission procedure.

Complementary calls could be launched if the proposals from above calls do not adequately cover the priority topics of the WP. These complementary calls could also include funds for topping up or expanding consortia in on-going activities.

The 2004 calls (deadline Dec 2004) will be preceded by a mid-term review of the WP and possibly an invitation to submit Expressions of Interest. The allocation of the budget between the various types of instrument is only preliminary and will be decided on the basis of the review of the use of the new instruments that will take place during 2004.

* Integrated Projects (IP), Networks of Excellence (NoE), Specific Targeted Research Projects (STRP), Co-ordination Actions (CA) and Specific Support Actions (SSA).

6.1.6. Call Information

The following sections describe the indicative content of the Calls for Proposals envisaged to cover the first two years of FP6. Note, however, that only the Call Information published in the Official Journal has legal effect.

6.1.6.1. Content of Call 2003.SM[5]

1. **Specific Programme**: Integrating and strengthening the European Research Area

2. **Activities**:
- Priority thematic area of research "Aeronautics and Space".
- ***Priority thematic area of research "Sustainable development, global change and ecosystems". Sub-priority "Sustainable energy systems"***
- Priority thematic area of research "Sustainable development, global change and ecosystems". Sub-priority "Sustainable surface transport"

3. **Call title**: Periodic call in the area of "Aeronautics and Space", ***"Sustainable energy systems"*** and "Sustainable surface transport".

4. **Call identifier**: [6]

5. **Date of publication**[7]: 17 December 2002.

6. **Closure date(s)**[8]:
- "Aeronautics and Space": 20 March 2003 at 17.00 (Brussels local time).
- ***"Sustainable energy systems": 18 March 2003 at 17.00 (Brussels local time).***
- "Sustainable surface transport": **15** ~~03~~ April 2003 at 17.00 (Brussels local time).

7. **Total indicative budget**: 140 Million €, broken down as follows
- "Aeronautics and Space": 19 Million €
- ***"Sustainable energy systems": 82 Million €***
- "Sustainable surface transport": 39 Million €

Instrument[9]	€ (millions)
IP	91
STREP and CA	49
SSA	

[5] Note that the call for the short-to-medium term part of "sustainable energy systems" will form part of a call including elements of "aeronautics and space" as well as "sustainable surface transport".

[6] The call identifier shall be given in the published version of this call.

[7] The director-general responsible for the publication of this call may publish it up to one month prior or after its envisaged publication date.

[8] When the envisaged publication date is either advanced or delayed, closure date(s) will be adjusted accordingly in the published call for proposals.

[9] IP = Integrated project; NOE = Network of excellence; STREP = Specific targeted research project; CA = Coordination action; SSA = Specific support action

8. Areas called and Instruments:

– Aeronautics and Space

Area	Topic	Instrument
1.3.1 Open Upstream Research. Research Area 1.3.1.4 Increasing the operational capacity and safety of the air transport system	Technical domain 1.3.1.4 c)	STREP and CA
	Technical domain 1.3.1.4 h)	CA
1.3.2 Integrated Focused Downstream Research	Topic 9	IP
	Topic 10	IP
	Topic 11	IP

– ***Sustainable energy systems***

Area	Topic	Instrument
Section 6.1.3.1.1.1 « Cost effective supply of renewable energies »	Large innovative wind turbines, components and design tools	IP
	Low cost photovoltaic modules with integrated dc/ac inverters that can feed directly into the grid	IP
	Innovative combinations of biomass and wastes with fossil fuels	STREP
	Innovative wind turbines, components and design tools	STREP
	New generation of PV technologies / products	STREP
	Geothermal energy	STREP
	All	CA and SSA
Section 6.1.3.1.1.2 "Large scale integration of renewable energy sources and energy efficiency"	RES-Electricity	CA and SSA
	Distributed electricity generation	CA and SSA
	Electricity storage systems	CA and SSA
	Heating and cooling	CA and SSA
Section 6.1.3.1.2.1 "Eco-buildings"	Innovative architecture aiming at low-energy demand buildings	IP and STREP
	Integration of renewable energy technologies and efficient technological solutions	IP and STREP
	Low energy construction and/or retrofitting materials, innovative components and technologies	IP and STREP
	Innovative building management systems (BMS)	IP and STREP
Section 6.1.3.1.3 "Alternative motor fuels"	Large scale integration of alternative fuels into the transport system. Considering resources, production, storage, distribution and use. Tools to monitor and stimulate demand.	IP, STREP, CA and SSA

	Assessment and monitoring of new and alternative fuel research activities	CA and SSA

– Sustainable surface transport

Area	Topic	Instrument
Objective 3 « Re-balancing and integrating different transport modes »	Freight Transport Corridors	IP
	City Logistics	STREP and CA
	Maritime navigation and information services	IP
	Maritime transport	CA
Objective 4 « Increasing road, rail and waterborne safety and avoiding traffic congestion »	Accident analysis and injury analysis	IP
	Road infrastructure safety	STREP

9. Minimum number of participants[10]:

Instrument	Minimum number of participants
IP, STREP and CA	3 independent legal entities from 3 different MS or AS, with at least 2 MS or ACC
SSA	legal entity from a MS or AS

10. Restriction on participation: None.

11. Consortia agreements:
- Participants in IP are required to conclude a consortium agreement.
- Participants in STREP, CA, and SSA resulting from this call are encouraged, but not required, to conclude a consortium agreement.

12. Evaluation procedure:
- The evaluation shall follow a single stage procedure.
- Proposals will not be evaluated anonymously.

13. Evaluation criteria: See Annex B of the work programme for the applicable criteria (including their individual weights and thresholds and the overall threshold) per instrument.

14. Indicative evaluation and contractual timetable:
- Evaluation results: estimated to be available within some 3 months after the closure date
- Conclusion of first contracts: it is estimated that the first contracts related to this call will come into force 8 months after the closure date.

15. Additional terms:
- It is expected that this call should not result in more than 50 to 60 projects

[10] MS = Member States of the EU; AS (incl. ACC) = Associated States; ACC = Associated candidate countries.

Any legal entity established in a Member State or Associated State and which is made up of the requested number of participant may be the sole participant in an indirect action.

6.1.6.2. Content of Call 2003.ML

1) Specific programme: Integrating and strengthening the European Research Area

2) Thematic priority/ domain: Priority thematic area of research "Sustainable development, global change and ecosystems, 1) Sustainable Energy Systems, ii) Research activities having an impact in the medium and longer term".

3) Call title: Thematic call in the area of "Sustainable development, global change and ecosystems, 1) Sustainable Energy Systems, ii) Research activities having an impact in the medium and longer term".

4) Call identifier: [11]

5) Date of publication[12]: 17 December 2002

6) Closure date(s)[13]: 18 March 2003 at 17.00 (Brussels local time).

7) Total indicative budget: 198 Million €, broken down as follows:

Instrument	€ (millions)
IP and NOE	129
STREP and CA	65
SSA	4

8) Areas called and instruments:

Section of the Work Programme	Topic/ area	Instrument
See section 6.1.3.2.1 (Fuel cells)	See the pertinent sections of the Work Programme for precise details of the topics and areas open for this call.	IP, NOE, STREP, CA and SSA, as detailed in the pertinent sections of the Work Programme.
See section 6.1.3.2.2 (New technologies for energy carriers)		
See section 6.1.3.2.3 (Renewable energy technologies)		
See section 6.1.3.2.4 (Capture and sequestration of CO_2)		
See section 6.1.3.2.5 (Socio-economic tools and concepts)		

[11] The call identifier shall be given in the published version of this call.

[12] The director-general responsible for the publication of this call may publish it up to one month prior or after its envisaged publication date.

[13] When the envisaged publication date is either advanced or delayed, closure date(s) will be adjusted accordingly in the published call for proposals.

9) Minimum number of participants[14]**:**

Instrument	Minimum number of participants
IP, NOE, STREP and CA	3 independent legal entities from 3 different MS or AS, with at least 2 MS or ACC.
SSA	1legal entity from a MS or AS.

10) Restrictions on participation: None.

11) Consortium agreements:

- Participants in IP and NOE are required to conclude a consortium agreement.
- Participants in STREP, CA, and SSA resulting from this call are encouraged, but not required, to conclude a consortium agreement.

12) Evaluation procedure:

- The evaluation shall follow a single stage procedure.
- Proposals will not be evaluated anonymously.

13) Evaluation criteria : See Annex B of the work programme for the applicable criteria (including their individual weights and thresholds and the overall threshold) per instrument and their application.

14) Indicative evaluation and contractual timetable:

- Evaluation results: estimated to be available within some 4 months after the closure date;
- Conclusion of first contracts: it is estimated that the first contracts related to this call will come into force before the end of 2003.

[14] MS = Member States of the EU; AS (incl. ACC) = Associated States; ACC = Associated candidate countries.

Any legal entity established in a Member State or Associated State and which is made up of the requested number of participant may be the sole participant in an indirect action.

6.1.6.3. Indicative content of Call 2004.SM[15]

1. **Specific Programme**: Integrating and strengthening the European Research Area

2. **Activities**:
- ***Priority thematic area of research "Sustainable development, global change and ecosystems". Sub-priority "Sustainable energy systems"***
- Priority thematic area of research "Sustainable development, global change and ecosystems". Sub-priority "Sustainable surface transport"

3. **Call title**: Periodic call in the area of ***"Sustainable energy systems"*** and "Sustainable surface transport".

4. **Call identifier**: [16]

5. **Date of publication**[17]: 17 June 2003.

6. **Closure date(s)**[18]**:** 17 December 2003 at 17.00 (Brussels local time).

7. **Total indicative budget:** 155 Million €, broken down as follows
- ***"Sustainable energy systems": 107 Million €***
- "Sustainable surface transport": 48 Million €

Instrument[19]	**€ (millions)**
IP	100
STREP and CA	55
SSA	

8. **Areas called and Instruments**:

- ***Sustainable energy systems***

Area	**Topic**	**Instrument**
Section 6.1.3.1.1.2 "Large scale integration of renewable energy sources and energy efficiency"	CONCERTO – Managing energy demand and renewable energy supply in high performance communities	IP
	All	STREP, CA and SSA

[15] Note that the call for the short-to-medium term part of "sustainable energy systems" will form part of a call including elements of "sustainable surface transport".

[16] The call identifier shall be given in the published version of this call.

[17] The director-general responsible for the publication of this call may publish it up to one month prior or after its envisaged publication date.

[18] When the envisaged publication date is either advanced or delayed, closure date(s) will be adjusted accodingly in the published call for proposals.

[19] IP = Integrated project; NOE = Network of excellence; STREP = Specific targeted research project; CA = Coordination action; SSA = Specific support action

Section 6.1.3.1.2.1 "Eco-buildings"	CONCERTO – Managing energy demand and renewable energy supply in high performance communities	IP
Section 6.1.3.1.2.2 "Polygeneration"	CONCERTO – Managing energy demand and renewable energy supply in high performance communities	IP
Section 6.1.3.1.3 "Alternative motor fuels"	Testing implementation and transition strategies for Clean Urban Transport – CIVITAS II	IP and SSA

– Sustainable surface transport

Area	Topic	Instrument
Objective 1 « New technologies and concepts for all surface transport modes (road, rail and waterborne) »	Testing implementation and transition strategies for Clean Urban Transport – CIVITAS II	IP and SSA
Objective 3 « Re-balancing and integrating different transport modes »	Implementation of change in the European Railway System	CA
Objective 4 « Increasing road, rail and waterborne safety and avoiding traffic congestion »	European service for electronic fee collection on roads	IP and STREP
	Costs of transport infrastructure use	STREP, CA and/or SSA
	Optimal investments and charging	STREP, CA and/or SSA

9. Minimum number of participants[20]:

Instrument	Minimum number of participants
IP, STREP and CA	3 independent legal entities from 3 different MS or AS, with at least 2 MS or ACC.
SSA	1 legal entity from a MS or AS

10. Restriction on participation: None.

11. Consortia agreements:

- Participants in IP are required to conclude a consortium agreement.
- Participants in STREP, CA, and SSA resulting from this call are encouraged, but not required, to conclude a consortium agreement.

12. Evaluation procedure:

- The evaluation shall follow a single stage procedure
- Proposals will not be evaluated anonymously.

[20] MS = Member States of the EU; AS (incl. ACC) = Associated States; ACC = Associated candidate countries.

Any legal entity established in a Member State or Associated State and which is made up of the requested number of participant may be the sole participant in an indirect action.

13. Evaluation criteria: See Annex B of the work programme for the applicable criteria (including their individual weights and thresholds and the overall threshold) per instrument.

14. Indicative evaluation and contractual timetable:

- Evaluation results: estimated to be available within some 3 months after the closure date

- Conclusion of first contracts: it is estimated that the first contracts related to this call will come into force 8 months after the closure date.

15. Additional terms:

- It is expected that this call should not result in more than 40 to 50 projects.

6.1.6.4. Indicative content of Call 2004.ML

1) Specific programme*:* "Integrating and strengthening the European Research Area"

2) Thematic priority/ domain: Priority thematic area of research "Sustainable development, global change and ecosystems, 1) Sustainable Energy Systems, ii) Research activities having an impact in the medium and longer term".

3) Call title*:* Thematic call in the area of "Sustainable development, global change and ecosystems, 1) Sustainable Energy Systems, ii) Research activities having an impact in the medium and longer term".

4) Call identifier: [21]

5) Date of publication: September 2003. Indicative date of publication will be specified in the relevant update of the work programme.

6) **Closure date (s)**: December 2003 Indicative closure date will be specified in the relevant update of the work programme.

7) Total indicative budget: 4 Million €

Instrument	EUR (millions)
SSA	4

8) Areas called and instruments:

Section of the Work Programme	Area	Instrument
See section 6.1.3.2.1 (Fuel cells)	See the pertinent sections of the Work Programme for precise details of the areas open for this call.	SSA
See section 6.1.3.2.2 (New technologies for energy carriers)		
See section 6.1.3.2.3 (Renewable energy technologies)		
See section 6.1.3.2.4 (Capture and sequestration of CO_2)		
See section 6.1.3.2.5 (Socio-economic tools and concepts)		

9) Minimum number of participants:

Instrument	Minimum number of participants
SSA	1 legal entity from a MS or AS

10) Restrictions on participation: None.

11) Consortium agreements:

- Participants in RTD actions resulting from this call are encouraged, but not required, to conclude a consortium agreement.

[21] The call identifier shall be given in the published version of this call.

12) Evaluation procedure:

- The evaluation shall follow a single stage procedure
- Proposals will not be evaluated anonymously.
-

13) Evaluation criteria: See Annex B of the work programme for the applicable criteria (including their individual weights and thresholds and the overall threshold) per instrument.

14) Indicative evaluation and contractual timetable:

- Evaluation results: estimated to be available within some 4 months after the closure date
- Conclusion of first contracts: it is estimated that the first contracts related to this call will come into force before the end of 2004.